



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

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D407-667-105TRN
Job Sheet 196122



Part No: D407-667-105TRN

Job Qty: 1 pcs

Part Name: Crosstube Turning Detail



Part Weight: 0 lbs

Status: New

Priority: Medium

Job Created: 6/7/19

Job Tracking No:

Due Date: 6/17/19

Created By: Marie Lajeunesse

Type: Stock

Description:

Note: DWG D407-667-145 REV.D IPP Rev:a 08.02.28 new issue EC IPP Rev B 08.04.02 Removed polish EC verified by: DD

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup Hrs	Run Hrs	Workcenter / Supplier	Lead Time	
100	Mori Selki TL-40 - 1	1 pcs	6/17/19	6/17/19	1.00	1.25	Mori Selki TL-40 - 1		DAS 662019/08/29 9-89
110	QC 2	1 pcs	6/17/19	6/17/19	0.00	0.00	QC 2 - 1		
							QC 2 - 12		
							QC 2 - 14		
							QC 2 - 17		
							QC 2 - 19		
							QC 2 - 2		
							QC 2 - 20		
							QC 2 - 22		
							QC 2 - 23		
							QC 2 - 25		
							QC 2 - 32		
							QC 2 - 33		
							QC 2 - 35		
							QC 2 - 39		
							QC 2 - 4		
							QC 2 - 40		
							QC 2 - 44		
							QC 2 - 45		
							QC 2 - 48		
							QC 2 - 49		
							QC 2 - 50		
							QC 2 - 51		
							QC 2 - 52		
							QC 2 - 57		
							QC 2 - 62		
							QC 2 - 63		
							QC 2 - 8		DAS 662019/08/29 9-89
							QC 2 - 66		
							QC 2 - 64		

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6/7/2019

[Dart Hawkesbury] Job Sheet - Lajeunesse, Marie

					QC 2 - 65	
					QC 2 - 5	
					QC 2 - 71	
					QC 2 - 73	
					QC 2 - 69	
120	Mori Selki TL-40 - 1 - B4B	1 pcs	6/17/19	1.00 1.12	Mori Selki TL-40 - 1 - B4B	DAS 662019/09/04 9-89
130	QC 2	1 pcs	6/17/19	0.00 0.00	QC 2 - 1	
					QC 2 - 12	
					QC 2 - 14	
					QC 2 - 17	
					QC 2 - 19	
					QC 2 - 2	
					QC 2 - 20	
					QC 2 - 22	
					QC 2 - 23	
					QC 2 - 25	
					QC 2 - 32	
					QC 2 - 33	
					QC 2 - 35	
					QC 2 - 39	
					QC 2 - 4	
					QC 2 - 40	
					QC 2 - 44	
					QC 2 - 45	
					QC 2 - 48	
					QC 2 - 49	
					QC 2 - 50	
					QC 2 - 51	
					QC 2 - 52	
					QC 2 - 57	
					QC 2 - 62	
					QC 2 - 63	
					QC 2 - 8	
					QC 2 - 66	DAS 662019/09/04 9-89
					QC 2 - 64	
					QC 2 - 65	
					QC 2 - 5	
					QC 2 - 71	
					QC 2 - 73	
					QC 2 - 69	
140	QC 8	1 pcs	6/17/19	0.00 0.00	QC 8 - 12	
					QC 8 - 14	
					QC 8 - 17	
					QC 8 - 20	
					QC 8 - 25	
					QC 8 - 3	
					QC 8 - 32	
					QC 8 - 33	
					QC 8 - 35	
					QC 8 - 39	
					QC 8 - 4	
					QC 8 - 44	
					QC 8 - 45	
					QC 8 - 49	
					QC 8 - 58	
					QC 8 - 8	
					QC 8 - 9	
					QC 8 - 68	
					QC 8 - 67	

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					QC 8 - 1 (A)	
					QC 8 - 47	
					QC 8 - 40	
					QC 8 - 52	DAS
					QC 8 - 23	76
					QC 8 - 57	9-89
145 Crosstubes - 2 - B4B	1 pcs	6/17/19	0.00 0.36		Crosstubes - 1 - B4B	
					Crosstubes - 2 - B4B	ISS 10/1/2019
					Crosstubes - 3 - B4B	
					Crosstubes - 4 - B4B	
150 Crosstubes - 3 - B4B	1 pcs	6/17/19	0.00 0.40		Crosstubes - 1 - B4B	
					Crosstubes - 2 - B4B	
					Crosstubes - 3 - B4B	NOV 01 2019
					Crosstubes - 4 - B4B	
160 QC 7	1 pcs	6/17/19	0.00 0.00		QC 7 - 10	
					QC 7 - 13	
					QC 7 - 14	
					QC 7 - 15	
					QC 7 - 17	
					QC 7 - 18	
					QC 7 - 19	
					QC 7 - 2	
					QC 7 - 28	
					QC 7 - 3	
					QC 7 - 30	
					QC 7 - 34	
					QC 7 - 36	
					QC 7 - 37	
					QC 7 - 41	
					QC 7 - 47	
					QC 7 - 48	
					QC 7 - 51	
					QC 7 - 58	
					QC 7 - 59	
					QC 7 - 60	
					QC 7 - 9	
					QC 7 - 68	
					QC 7 - 50	DAS
					QC 7 - 67	76
					QC 7 - 40	9-89
					QC 7 - 24	
					QC 7 - 43	
170 Packaging 3-1 - Stock - B4B 1 pcs		6/17/19	0.00 0.00		Packaging 3 - 1 - B4B	
					Packaging 3 - 2 - B4B	
					Packaging 3 - 3 - B4B	
					Packaging 3 - 4 - B4B	
					Packaging 3 - 5 - B4B	
					Packaging 3 - 6 - B4B	
					Packaging 3 - 7 - B4B	
					Packaging 3 - 8 - B4B	
					Packaging 3 - 9 - B4B	
					Packaging 3 - 10 - B4B	
					Packaging 3 - 11 - B4B	
					Packaging 3 - 12 - B4B	
					Packaging 3 - 13 - B4B	
					Packaging 3 - 14 - B4B	
					Packaging 3 - 15 - B4B	
					Packaging 3 - 16 - B4B	
					Packaging 3 - 17 - B4B	

				Packaging 3 - 18 - B4B	
				Packaging 3 - 19 - B4B	
				Packaging 3 - 20 - B4B	
				Packaging 3 - 21 - B4B	
				Packaging 3 - 22 - B4B	
				Packaging 3 - 23 - B4B	
				Packaging 3 - 24 - B4B	353 11/11/2019
				Packaging 3 - 25 - B4B	
				Packaging 3 - 26 - B4B	
				Packaging 3 - 27 - B4B	
				Packaging 3 - 28 - B4B	
				Packaging 3 - 29 - B4B	
				Packaging 3 - 30 - B4B	
				Packaging 3 - 31 - B4B	
				Packaging 3 - 32 - B4B	
				Packaging 3 - 33 - B4B	
				Packaging 3 - 34 - B4B	
				Packaging 3 - 35 - B4B	
				Packaging 3 - 36 - B4B	
180 QC 21 - SA	1 pcs	6/17/19	0.00 0.00	QC 21 - SA - 21	254
				QC 21 - SA - 70	6.5
				QC 21 - SA - 53	

NOV 11 2019

Part Op 100 - 1- Fill tube with sand & install plugs 407-105 on both ends as per Folio FA249 2- Turn both side of tube 3- Turn first
 Descriptions: taper section on both side as per folio FA249
 110 - (QC2- Inspect parts off machine FAI/FAIB)
 120 - 1- Turn second taper on both side 4- Scribe part # and batch # using vibrating stylus on the cuff as per Dwg D407-667-145 5- Ultra sound the crosstube as per FAI. "wall thickness mesurment" at given location.
 130 - (QC2- Inspect parts off machine FAI/FAIB)
 140 - (QC8- Inspect parts - second check)
 145 - GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.
 150 - 1- handfinish X-TUBE INSIDE AND OUT
 160 - (QC7-Inspect Chemical Conversion Coat)
 170 - (Identify as per dwg & Stock Location: _____) LOCATION : LG014
 180 - (QC21- Final Inspection - Work Order Release)

Job BOM				
Part / Item	Component Name	Quantity	Operation	Container
D6010-115	Crosstube Material	1 pcs (1 ea)	100-Mori Seiki TL-40 - 1	E123975

Job Allocations				
Operation	Component Part	Required	Inventory	Allocated
100-Mori Seiki TL-40 - 1	D6010-115	1	110	0

Part Specifications	
Specifications could not be found.	



Container No: S210352



Part: D407 - 667 - 105TRN

Job No: 196122

Serial No/Batch: S210352

Revision: D

Inspector:

Exp Date:

Instructions:

DART Aerospace Ltd.
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Date: 06/29/19

②

DART AEROSPACE LTD	Work Order:	196122
Description: Crosstube Assembly	Part Number:	D407-667-145
Inspection Dwg: D407-667-145 Rev: D		Page 1 of 2

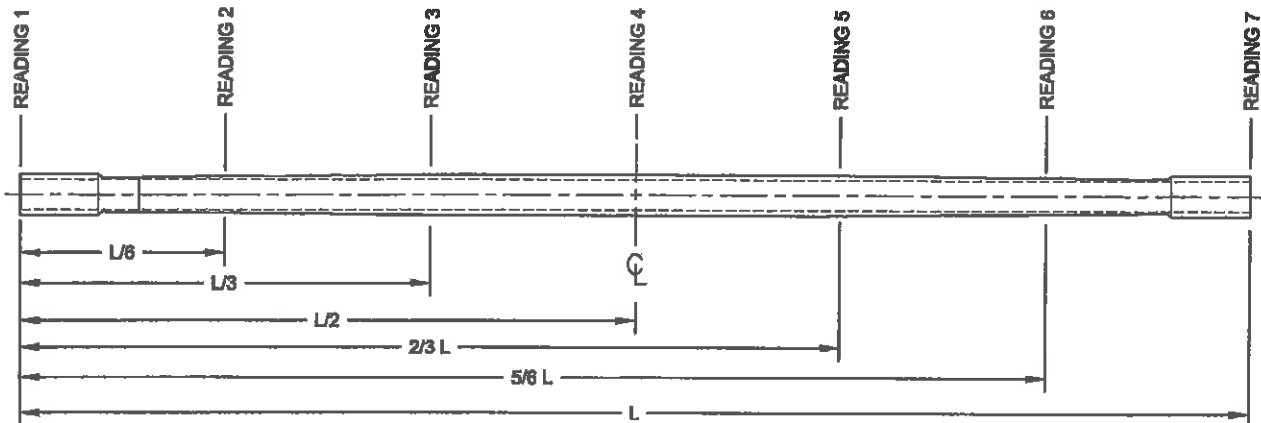
FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.240	✓		CNC-04	
	1.865	+0.005/-0.000	1.870	✓		CNC-08	
	1.878	+0.005/-0.000	1.882	✓			
	1.970	+0.005/-0.000	1.974	✓		↓	
	2.030	+0.005/-0.000	2.035	✓		CNC-04	
	2.165	+0.005/-0.000	2.170	✓		"	
	0.125	+/-0.010	.122	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	R0.063	+/-0.010	.063	✓		"	
SIDE B	4.438	+/-0.030	4.442	✓		CNC-08	
	2.240	+0.005/-0.000	2.240	✓		CNC-04	
	1.865	+0.005/-0.000	1.870	✓		CNC-08	
	1.878	+0.005/-0.000	1.883	✓			
	1.970	+0.005/-0.000	1.975	✓		↓	
	2.030	+0.005/-0.000	2.035	✓		CNC-04	
	2.165	+0.005/-0.000	2.170	✓		"	
	0.125	+/-0.010	.119	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	R0.063	+/-0.010	.063	✓		"	
	4.438	+/-0.030	4.439	✓		CNC-08	
	113.20	+/-0.020	113.79	✓		Tape	

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DART AEROSPACE LTD	Work Order: 196127
Description: Crosstube Assembly	Part Number: D407-667-145
Inspection Dwg: D407-667-145 Rev: D	Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L = 0"	.323	.316	.288	.316	.035	0.042"
READING 2 L = 18.867	.183	.171	.155	.173	.028	
READING 3 L = 37.734	.282	.265	.250	.282	.032	
READING 4 L = 56.700	.323	.314	.304	.313	.019	
READING 5 L = 75.467	.282	.269	.249	.273	.033	
READING 6 L = 94.333	.183	.165	.156	.174	.027	
READING 7 L = 113.20	.335	.303	.296	.314	.032	

Calibration Result

Actual Block Thickness: 100-500

Sitescan 250 Measured Thickness: 100-500

Measured by:	DAS 66
Date:	2019/09/04

Audited by:	DAS 76
Date:	9-89

Preliminary Approval:	
Date:	

Rev	Date	Change	Revised by	Approved
C	09.06.11	Dwg Rev updated	KJ	
D	11.06.21	Tolerance revised for 4.438 dimension	KJ	
E	12.06.04	Wall thickness form added	KJ	
F	19.03.27	Dwg Rev updated	MG	

Item	Qty	Part Number	Description
1	-145		
1	X	D407-867-145	CROSSTUBE ASSEMBLY (407 HIGH FWD)
2	1	D6010-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2891-1	SUPPORT
6	4	D3595-063-395	RUBBER CUSHION
7	4	MS21920-20	CLAMP (OR MS21920-21)
8	14	MS20601AD4W10	RIVET (OR NAS8302B-4-10)
9	AR	PROSEAL 880 B-2	SEALANT, AMS-S-8802 CLASS B-2
10	2	AN742D38	CLAMP
11	2	MS9165-08	ANGLE BRACKET
12	2	MS21042L3	NUT (OR MS21042-3)
13	2	MS21039-1-08	SCREW
14	4	NAS1148C0332R	WASHER (OR AN980C10L)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6010-115
FINISHED LENGTH = 113.20±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D407-867-145" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 17.8 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 9% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) TO INSTALL D2891-1 SUPPORT: ABRASIVE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 880 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 13) INSTALL MS21920-20 CLAMPS (OR -21) WITH D3595-063-395 RUBBER CUSHIONS TO SECURE THE D2891-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS ARE LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 880 SEALANT HAS CURED FOR 72 HOURS.
- 16) MASK AREA UNDER CLAMP PRIOR TO PAINTING.
- 17) SEAL EDGES WHERE AN742D38 CLAMP MEETS WITH THE CROSSTUBE USING SIKAFLEX-241/-291 OR MIL-S-8802 CLASS B2 OR PROSEAL 880 SEALANT.
- 18) PERFORM RESISTANCE CHECK TO ENSURE MAX RESISTANCE IS 10 MILLION LBS.

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RETURN TO
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UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 1806122 M3
1406-02

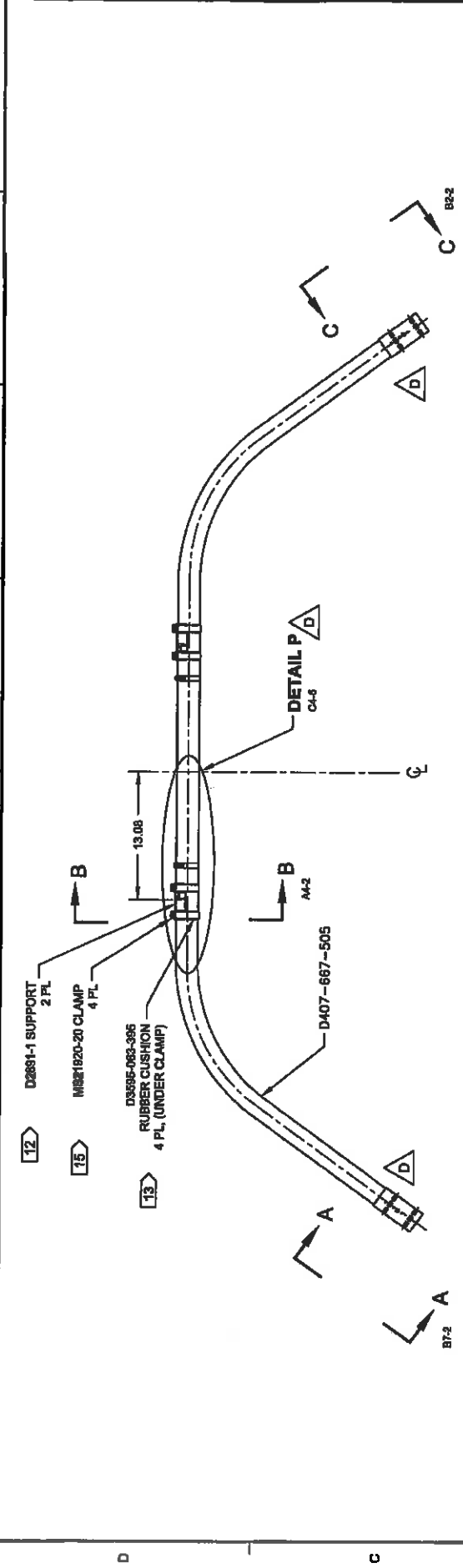
D	REVISE SHEET 2 ASSEMBLY DETAIL HOLE PATTERN PER CAR16-221. UPDATE PARTS LIST AND GENERAL NOTES 12 & 15 TO INCORPORATE DEO C-1. ADD ITEMS 10-14 TO PARTS LIST, ADD GENERAL NOTES 15-18 AND ADD SHEET 5 TO INCORPORATE DEO C-2.	JMH	18.05.01
C	REVISE GENERAL NOTES PART LIST (2N D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-395 D2891-08-084 (2N D5-3 & A5-2); REMOVED REF. 7 ADD TOLERANCES (2N C5-3, C4-3, C3-3); RELOCATED FLAG #8 (2N A5-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATIBILITY WITH BHTMA SKIDTUBES	PH	05.07.25
A	NEW ISSUE	CP	02.05.08
REV.	DESCRIPTION	BY	DATE
DESIGN	JMH		
DRAWN	JMH		
CHECKED	ZF		
MFG. APPR.	PH		
APPROVED	NO		
DE APPR.			
DATE	18.05.01		

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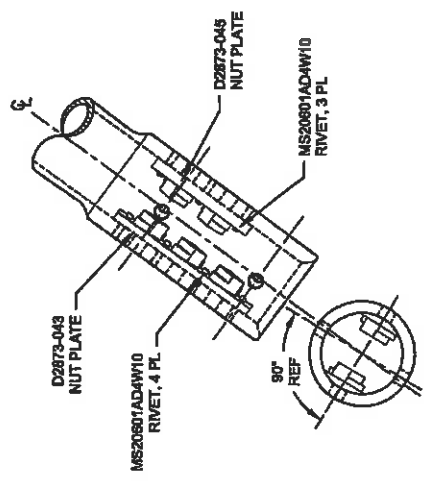
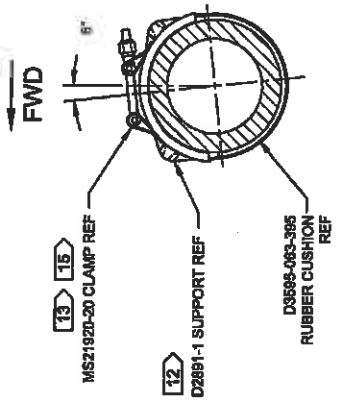
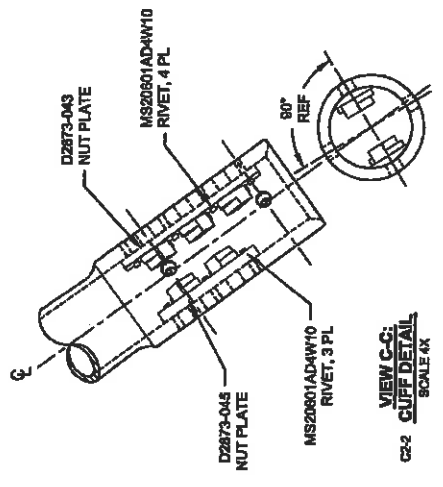
2018 SEP 06
2018-177

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	REV. D
DRAWING NO. D407-867-145	SHEET 1 OF 5
TITLE CROSSTUBE ASSY (407 HIGH FWD)	SCALE
DATE 18.05.01	NTS

1 2 3 4 5 6 7 8



D407-667-145
ASSEMBLY DETAIL
(VIEW LOOKING FWD)

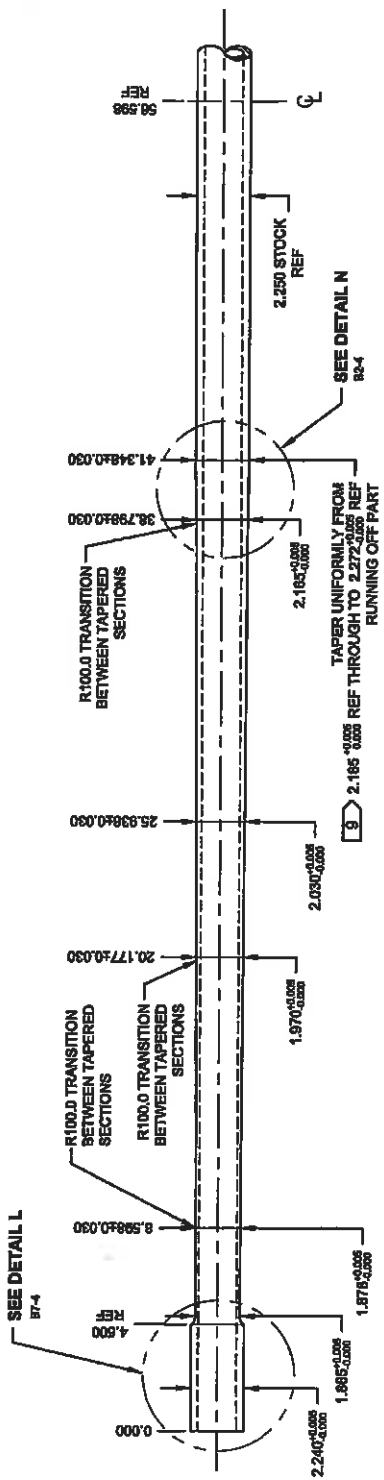


DESIGN	φ	DART AEROSPACE LTD
DRAWN	JMH	HAWKESBURY, ONTARIO, CANADA
CHECKED	ZF	DRAWING NO. REV. D
MFG. APPR.	MF	D407-667-145 SHEET 2 OF 6
APPROVED	MD	TITLE CROSSSTUBE ASSY (407 HIGH FWD) SCALE
DE APPR.	φ	DATE 18.05.01 NTS

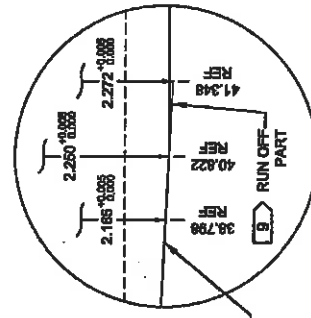
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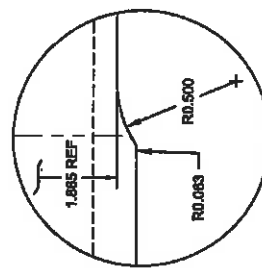
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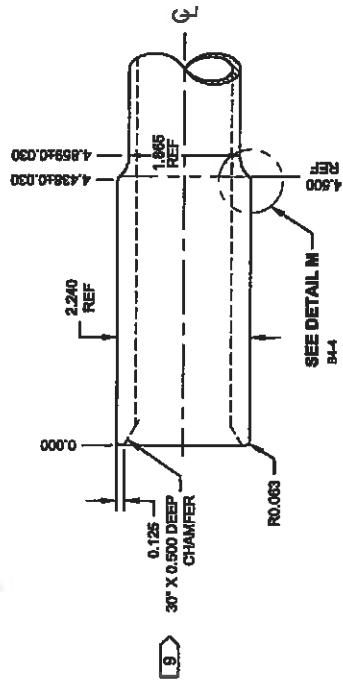
TURNING DETAIL



DETAIL N:
 TAPER RUN-OFF
 CS-4 NOT TO SCALE



DETAIL M:
 CUFF TRANSITION
 BA-4 NOT TO SCALE



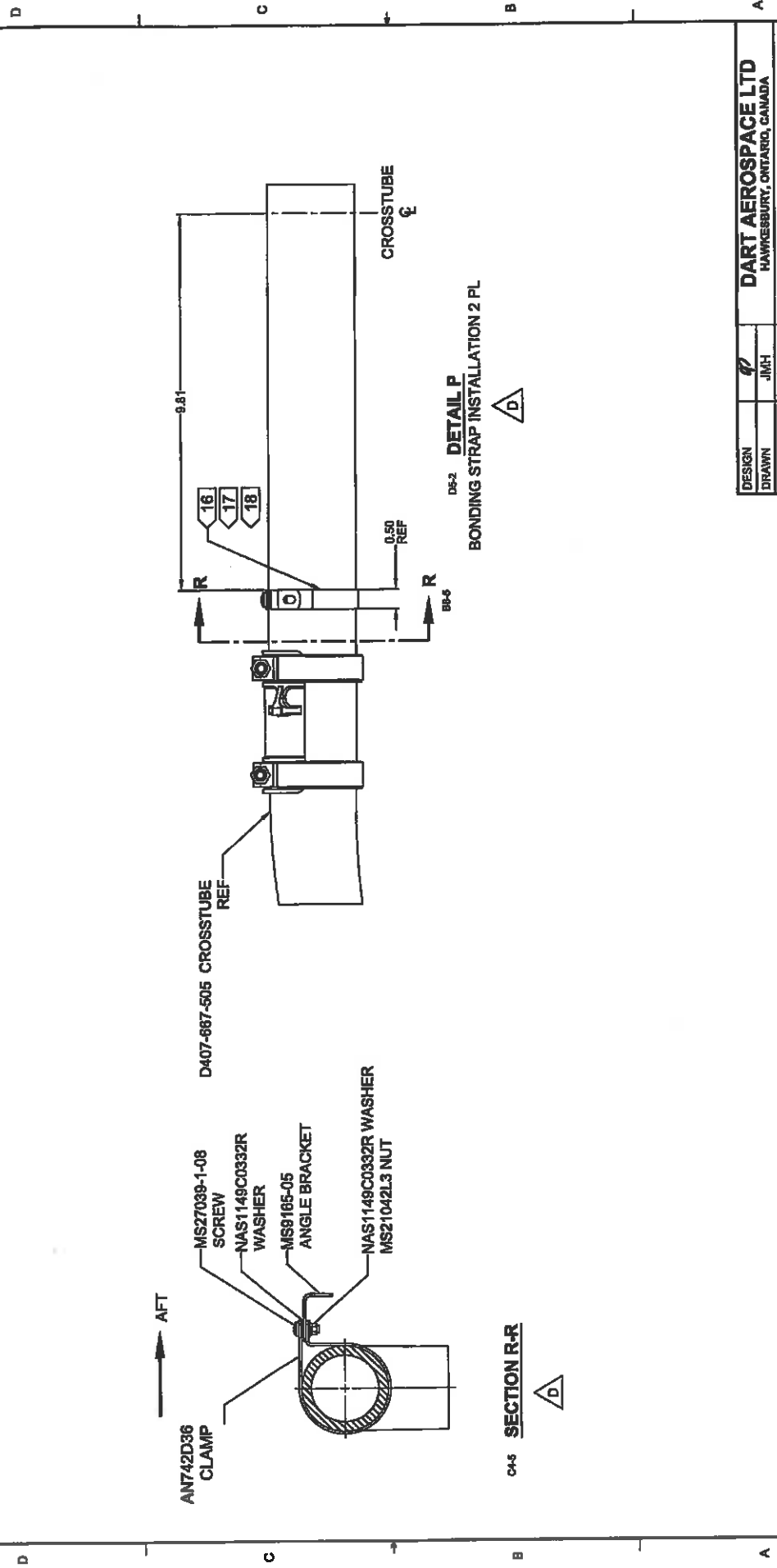
DETAIL L:
 CROSS-TUBE CUFF
 DT-4 NOT TO SCALE

DESIGN	0	DART AEROSPACE LTD	REV. D
DRAWN	JMH	HAWKESBURY, ONTARIO, CANADA	SHEET 4 OF 5
CHECKED	ZF	DRAWING NO.	D407-887-145
INFO. APPR.	AF	TITLE	CROSSTUBE ASSY (407 HIGH FWD)
APPROVED	W	SCALE	NTS
DATE	18.05.01	CROSS-TUBE ASSY (407 HIGH FWD)	NTS

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 2018 SEP 06

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1 2 3 4 5 6 7 8



DESIGN	φ	DART AEROSPACE LTD
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CHECKED	ZF	DRAWING NO.
MFG. APPR.	AK	D407-687-145
APPROVED	ND	TITLE
DATE	18.05.01	CROSSTUBE ASSY (407 HIGH FWD)
		SCALE
		NTS

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2018 SEP 06

REVISIONS
REV. D
SHEET 5 OF 5
CROSSTUBE ASSY (407 HIGH FWD)
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HAWKSBURY, ONTARIO, CANADA
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Entered: _____ Date: _____

WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

Route update only ☐

NCR No. _____

Job: _____ Part No. _____		DISPOSITION			DEPARTMENT/PROCESS					
		Rework ☐ Scrap ☐ Use-as-is ☐			Cross tube ☐ Small Fab ☐ Finishing ☐		Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐		Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐	
Date: _____	Sequence #: _____	QTY Affected: _____		MIRB (QSI042)						
Description Work Order Deviation				Disposition						
Root Cause				FAULT CATEGORY						
Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Preservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐				Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled ☐ Other/Details: _____ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread ☐						
Completed By				Lead hand / Supervisor						
QC / QA Coordinator										